MONTANA STANDARDS FOR TECHNOLOGY

Properly applied, technology enhances instruction in a way that powerfully increases learning, but does not become the focus of learning. By providing access to information, opening pathways to communication, and facilitating personal understanding, technology supports learning in all subjects.

Effective integration of technology into the learning environment encourages movement from teacher-centered instruction to student-centered learning—learning in which multi-sensory stimulation combines with increased student responsibility to widen the opportunity for all students to succeed.

Technologically literate students work collaboratively in inquiry-based learning activities, rich in relevant content, while thinking critically and solving problems in real-world contexts.

Technologically literate students use their skills across the curriculum to support their learning, while building lifelong learning habits and marketable skills.

Content Standards indicate what all students should know, understand and be able to do in a specific content area.

Benchmarks define our expectations for students' knowledge, skills, and abilities along a developmental continuum in each content area. That continuum is focused at three points—the end of grade 4, the end of grade 8 and grade 12.

Technology Content Standard 1—Students demonstrate an understanding of the basic operations of technologies.

Technology Content Standard 2—Students use a variety of technologies to enhance productivity.

Technology Content Standard 3—Students use a variety of technologies for communication.

Technology Content Standard 4—Students use technology responsibly and understand its impact on individuals and society.

Technology Content Standard 5—Students develop the skills, knowledge and abilities to apply a variety of technologies to conduct research, manage information, and solve problems.

Technology Content Standard 6—Students apply technological abilities and knowledge to construct new personal understanding.

Technology Content Standard 1

Students demonstrate an understanding of the basic operations of technologies.

Rationale

Students need to construct a base of technical skills in order to be competent and confident users of technology. These basics will assure safe and efficient operation as students apply technology.

Benchmarks

Students will:

End of Grade 4	End of Grade 8	Upon Graduation—End of Grade 12
1. develop basic skills and procedures needed to operate various technologies.	1. use and refine skills and procedures needed to operate various technologies.	1. use and enhance an established repertoire of skills and procedures as needed to operate various technologies.
2. communicate using appropriate terminology and demonstrate simple care and maintenance of various technology tools.	2. develop competence with basic system and tool set-up, technical terminology, and basic care and maintenance.	2. demonstrate competence with basic system and tool set-up, technical terminology, basic care and maintenance.
3. identify and solve simple operating problems.	3. develop troubleshooting strategies to solve operations problems (e.g., lost files, equipment failures).	3. use and refine troubleshooting strategies to solve technical operations problems.

Technology Content Standard 2

Students use a variety of technologies to enhance productivity.

Rationale

Tools, materials and processes can be applied to improve efficiency and effectiveness and ease task completion. With an appropriate number of technologies, students can match the tool to the task and improve their productivity.

Benchmarks

Students will:

End of Grade 4	End of Grade 8	Upon Graduation—End of Grade 12
1. develop skills to enhance performance and ease task completion (e.g., word processing, calculating, graphing, imaging).	1. refine skills to enhance performance and ease task completion (e.g., programming, authoring, editing).	1. apply sophisticated skills and strategies to enhance performance and ease task completion.
2. develop and present a project using technology.	2. apply technology in designing, developing and presenting a project.	2. integrate technology in designing, developing, presenting and managing projects.
3. choose appropriate technology for a task.	3. compare technologies and select the best one for a task.	3. analyze and evaluate a variety of technologies and match the best technology to a task.

Technology Content Standard 3

Students use a variety of technologies for communication.

Rationale

Today's and tomorrow's citizens need to communicate effectively using appropriate technologies. Citizens need to use appropriate communication technologies to collaborate and to exchange ideas and information.

Benchmarks

Students will:

End of Grade 4	End of Grade 8	Upon Graduation—End of Grade 12
1. use multiple communication technologies to fulfill a variety of purposes.	1. identify and use telecommunications tools to exchange ideas and information with others (e.g., geographic information, system map, web page).	1. select and apply telecommunications tools to exchange ideas and information (e.g., geographic information system map, multi-media presentation, web page).
2. explore online telecommunications tools.	2. identify and use telecommunications tools to participate in online projects.	2. use telecommunications tools to participate in collaborative online projects.

Technology Content Standard 4

Students use technology responsibly and understand its impact on individuals and society.

Rationale

Students need to understand that today's technology is an extremely powerful tool impacting all aspects of human life. In using this technology students should demonstrate both sound judgment and respect.

Benchmarks

Students will:

End of Grade 4	End of Grade 8	Upon Graduation—End of Grade 12
1. safely use various technologies (e.g., Internet, software, computers).	1. safely use various technologies (e.g., e-mail, chat software, tools).	1. safely use various technologies (e.g., robotics, workplace tools).
2. describe ethical technology use (e.g., fair use, ownership).	2. develop a personal code of standards for ethical technology use (e.g., privacy, copyright, etiquette).	2. model and exemplify a high standard of ethics for the uses of technology (e.g., privacy, intellectual property).
3. identify some impacts of technology on people.	3. explore the present and future impacts of technology on people and the environment.	3. evaluate the present and future impacts of technology on society, economy and the environment.

Technology Content Standard 5

Students develop the skills, knowledge and abilities to apply a variety of technologies to conduct research, manage information and solve problems.

Rationale

Current and emerging technology tools will provide increased and alternative methods for problem-solving and thinking. Students must be able to assess the credibility of information sources, use sophisticated search technologies to support research, problem-solving and decision making.

Benchmarks

Students will:

End of Grade 4	End of Grade 8	Upon Graduation—End of Grade 12
1. ask a question and use technology to find answers.	1. ask questions and use technology resources to solve problems.	1. ask questions and use technology resources for self-directed learning and problem-solving.
2. use various technologies to identify sources and access information.	2. use various technologies and develop strategies to assess the quality of sources and information.	2. evaluate the accuracy, relevance, appropriateness, comprehensiveness and bias of electronic information.
3. identify information from technical sources and communicate findings.	3. organize information from technical sources and communicate findings.	3. organize and analyze information from technical sources and communicate findings.

Technology Content Standard 6

Students apply technological abilities and knowledge to construct new personal understanding.

Rationale

Technologies develop in response to the changing needs of the individual and society. Technological literacy implies not only understanding current applications of technology to common tasks and problems, it implies that students use technology to build new understandings, formulate novel hypotheses, and generate innovative solutions to challenging problems. Technological tools should be applied in ways that foster exploration and invention appropriate to the age and ability of the student.

Benchmarks

Students will:

End of Grade 4	End of Grade 8	Upon Graduation—End of Grade 12
1. apply existing information to develop personal understanding.	1. analyze and apply existing information to generate personal understanding.	1. analyze and evaluate existing information to generate personal understanding.
2. create original work using various technologies.	2. create a collection of original work using various technologies.	2. create a portfolio of original work using various technologies.
3. apply a variety of technologies to investigate a problem within a content area.	3. apply a variety of technologies to investigate a problem across content areas.	3. evaluate and apply a variety of technologies to investigate complex problems in multidisciplinary contexts.
4. apply personal understanding and technologies to solve a problem.	4. apply personal understanding and technologies to develop an invention or original solution to an authentic problem.	4. apply and evaluate personal understanding to develop an invention or innovative solution to an authentic problem.

Technology Performance Standards

The Technology Performance Standards describe students' knowledge, skills, and abilities in the technology content area on a continuum from kindergarten through grade 12. These descriptions provide a picture or profile of student achievement at four performance levels: advanced, proficient, nearing proficiency, and novice.

Advanced:	This level denotes superior performance.
Proficient:	This level denotes solid academic performance for each benchmark. Students reaching this level have demonstrated competency over challenging subject matter, including subject-matter knowledge, application of such knowledge to real-world situations, and analytical skills appropriate to the subject matter.
Nearing Proficiency:	This level denotes that the student has partial mastery or prerequisite knowledge and skills fundamental for proficient work at each benchmark.
Novice:	This level denotes that the student is beginning to attain the prerequisite knowledge and skills that are fundamental for work at each benchmark.

Grade 4 Technology

Advanced: (1) A fourth-grade student at the advanced level in technology demonstrates superior performance. He/she:

(a) demonstrates an understanding of the overall operations and responsible use of technologies and explores advanced concepts;

(b) uses technology to accomplish the task in an effective and efficient manner;

(c) uses technology eagerly to communicate understanding;

(d) identifies impacts of technologies on society and uses technology ethically and safely;

(e) independently and enthusiastically seeks information from technological sources, and thoroughly communicates the information through an original product; and

(f) confidently applies technological skills to create original work and solve problems in multidisciplinary contexts.

Proficient: (1) A fourth-grade student at the proficient level in technology demonstrates solid academic performance. He/she:

(a) demonstrates understanding of the overall operations and responsible use of appropriate technologies;

(b) identifies and chooses appropriate technology to complete the task;

(c) uses technology to communicate understanding;

(d) recognizes impacts of technology on society and uses technologies ethically and safely;

(e) finds information from technological sources and communicates the information through an original product; and

(f) uses technological skills to create original work and solve problems in multidisciplinary contexts.

Nearing Proficiency: (1) A fourth-grade student at the nearing proficiency level in technology demonstrates partial mastery of the prerequisite knowledge and skills fundamental for proficiency in technology. He/she:

(a) demonstrates a basic understanding of the overall operations and responsible use of appropriate technologies;

(b) identifies and, with assistance, chooses technology for the task;

(c) uses technology, with assistance, to communicate understanding;

(d) recognizes the obvious impacts of technology on society and usually uses technologies ethically and safely;

(e) finds information, with assistance, and communicates the information through a product; and

(f) uses technological skills, with assistance, to create a product or solve a problem in a content area.

Novice: (1) A fourth-grade student at the novice level in technology is beginning to attain the prerequisite knowledge and skills that are fundamental at each benchmark in technology. He/she:

(a) demonstrates limited understanding of the overall operations and responsible use of appropriate technologies;

(b) seldom identifies or uses technology for a task;

(c) uses technology, with assistance, to communicate;

(d) seldom recognizes the impacts of technology on society and needs to be reminded to use technologies ethically and safely;

(e) finds information and, with assistance, communicates the information through a simple product; and

(f) has difficulty using limited technological skills to create a product or solve a problem.

Grade 8 Technology

Advanced: (1) An eighth-grade student at the advanced level in technology demonstrates superior performance. He/she:

(a) applies thorough understanding of the overall operations and responsible use of technologies, and pursues advanced concepts;

(b) integrates technology into most phases of projects by consistently and effectively matching technologies to the task;

(c) identifies and uses technology to efficiently communicate and collaborate in a variety of ways;

(d) thoughtfully identifies the impact of technology on society and consistently uses technologies ethically and safely;

(e) applies information about available technologies to locate useful information, and thoughtfully communicates findings through a well-developed original product; and

(f) independently evaluates and applies technological skills to create original work and/or solve problems in multidisciplinary contexts.

Proficient: (1) An eighth-grade student at the proficient level in technology demonstrates solid academic performance. He/she:

(a) demonstrates clear understanding of the overall operations and responsible use of technologies, and explores new concepts;

(b) integrates technology into most phases of projects by matching technologies to the task;

(c) identifies and uses communication technology to communicate and collaborate in a variety of ways;

(d) identifies the impact of technology on society and uses technologies ethically and safely;

(e) uses information about available technologies to locate useful information, and communicates findings through an original product; and

(f) applies technological skills to create original work and/or solve problems in multidisciplinary contexts.

Nearing Proficiency: (1) An eighth-grade student at the nearing proficiency level in technology demonstrates partial mastery of the prerequisite knowledge and skills fundamental for proficiency in technology. He/she:

(a) demonstrates a basic understanding of the overall operations and responsible use of appropriate technologies, and sometimes explores new concepts;

(b) integrates technology, with assistance, into obvious phases of projects and sometimes identifies technologies for the task;

(c) identifies and, with assistance, uses technology to communicate and collaborate;

(d) sometimes identifies the impact of technology on society but most often uses technologies ethically and safely;

(e) finds information from technological sources and, with assistance, communicates the information through a product; and

(f) sometimes uses technological skills to create a product or solve a basic problem in a content area.

Novice: (1) An eighth-grade student at the novice level in technology is beginning to attain the prerequisite knowledge and skills that are fundamental at each benchmark in technology. He/she:

(a) demonstrates a limited understanding of the overall operations and responsible use of appropriate technologies;

(b) has difficulty selecting or using technology in projects;

(c) seldom uses technology to communicate;

(d) has limited understanding of the impact of technology on society, and needs to be reminded to use technologies ethically and safely;

(e) finds information from technological sources and, with assistance, communicates the information through a simple product; and

(f) has difficulty using technological skills to complete a product or solve a basic problem in a content area.

Upon Graduation Technology

Advanced: (1) A graduating student advanced in the use of technology demonstrates superior performance. He/she:

(a) evaluates and applies appropriate technology skills and procedures and pursues advanced concepts and operations;

(b) independently and effectively integrates technology into all phases of projects, and skillfully matches technologies to the task;

(c) independently and routinely uses the most effective technologies to thoughtfully and skillfully match technologies to the task;

(d) consistently evaluates the impact of technology on society and always uses technologies ethically and safely;

(e) effectively applies information about available technologies to locate information, to analyze and evaluate the information, and to thoroughly communicate findings through an original and complex product; and

(f) independently and routinely analyzes, evaluates, and applies technological skills to create original work and solve problems in multidisciplinary contexts.

Proficient: (1) A graduating student proficient with technology demonstrates solid academic performance. He/she:

(a) applies appropriate skills and procedures, and explores increasingly complex concepts and operations;

(b) integrates technology into most phases of projects, selecting appropriate technologies for the task;

(c) demonstrates independence in using technologies to effectively communicate and collaborate in a variety of ways;

(d) evaluates the impact of technology on society and uses technologies ethically and safely;

(e) applies information about available technologies to locate information, to analyze and evaluate the information, and to organize the information to effectively communicate through an original product; and

(f) typically evaluates and applies technological skills to create original work and solve problems in multidisciplinary contexts.

Nearing Proficiency: (1) A graduating student nearing proficiency in the use of technology demonstrates partial mastery of prerequisite knowledge and skills. He/she:

(a) often applies skills and procedures, and sometimes explores new concepts and operations;

(b) integrates technology, with assistance, in obvious phases of projects, and sometimes selects the appropriate technologies for the task;

(c) demonstrates limited independence in using technologies to communicate and collaborate;

(d) sometimes evaluates the impact of technologies on society and often uses technologies ethically, legally and safely.

(e) uses technology to locate some information and to organize the information to communicate through a product; and

(f) sometimes evaluates and uses technological skills to create a project or solve a problem in a content area.

Novice: (1) A graduating student at the novice level in the use of technology is beginning to attain prerequisite knowledge and skills. He/she:

(a) uses limited skills and procedures to identify and sometimes explore new concepts and operations;

(b) selects and uses technology in some phases of projects with assistance;

(c) uses technologies, with assistance, to communicate ideas and information;

(d) seldom considers the impact of technologies on society, and inconsistently uses technologies ethically and safely;

(e) identifies, with assistance, the need for information, selects and uses technologies to locate some of the information needed, and simply organizes the information to communicate in a limited way; and

(f) uses technologies in a limited way to complete an assignment or solve a simple problem in a specific content area.